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## A NESTING OF THE PHILADELPHIA VIREO.

BY HARRISON F. LEWIS.

*(Concluded from p. 44).*

*July 4.* The nest was observed from 6.15 a. m. to 6.25 a. m., during which time it was uncovered. At 6.40 a. m., when I approached to climb the nesting-tree, one bird was brooding. When I had reached a position where my head was but a foot below the nest I could hear the low "peep's" of the young birds issuing from beneath the parent. I observed also that the tips of the old bird's tail-feathers were becoming quite frayed. After it had flown away silently the young birds continued their cries unchanged. Two young only would raise their heads and open their mouths when the nest was touched, but those two would do it repeatedly. I could see a distinct line of down on each bird, extending from the top of its head along the nape of its neck and the middle of its back. Pin-feathers showed plainly in the young birds' wings.

The nest was observed at 7.25 a. m., 12.00 m., 12.25 p. m., 4.45 p. m., and 6.43 p. m., but at none of those hours was any bird seen on it. The break-up of regular, sustained brooding seems therefore to have come on July 3rd, two days after the last egg was hatched, as it will have been noted that the nest was uncovered when seen on the afternoon of that day. It is possible that the quarrel observed on the morning of that day bore some relation to this cessation of sustained brooding.

At 6.43 p. m. I climbed the nesting-tree, and when I reached a point where my head was about five feet below the nest I observed a parent Vireo, with food in its bill, on a small twig just below its home. The yellow of its underparts was particularly conspicuous at that time. It looked at me fixedly, but when I climbed two feet nearer to it, it flew away quietly. The young were found to be so large that their heads, when at rest, were on a level with the rim of the nest. Three of them repeatedly lifted their heads and opened their mouths when the nest was touched.

July 5. The nest was uncovered at 7.05 a. m., but at 7.25 a. m. a bird was seen on it.

At 6.10 p. m., when I took a position to observe the nest, no bird was on it. Both parent birds returned to it together at 6.12 p. m., but I was unable to see whether or not they fed the young. A few seconds later they departed, one after the other. At 6.21 p. m. one bird returned, fed the young, and immediately went away again. I climbed the nesting-tree at 6.22 p. m. and found the four young birds much larger than they were before. Their bills had become longer and more pointed, and had changed from yellow to light brown. All four of them would repeatedly lift their heads and open their mouths when the nest was touched. I took the top bird, probably the oldest, out of the nest to examine it more carefully. Its eyelids were open the merest slit. The pin-feathers on its upperparts were a dark bluish-gray and those on its sides and underparts were yellowish-white. An area of short pin-feathers covered practically all of the top of the head, from which a line of such pin-feathers extended down the nape of the neck and the middle of the back to the oil-gland. This line was sparse on the nape of the neck, while in a small area in the middle of the back it was twice its usual width. The pin-feathers on the wings were well-developed, those of the primaries being fully half an inch long. There was a small area of pin-feathers just above each leg. An area of pinfeathers covering the chin and throat divided just above the breast and passed in two broad bands, one on each side, along the sides of the body to a point well past the leg. The lower ends of these bands were each slightly forked. I replaced the young bird in the nest and descended to the ground at 6.29 p. m.

July 6. Between 12.51 p. m. and 2.35 p. m. the young were fed at 12.52, 1.17, 1.20, 1.28, 1.39, 1.46, 1.52 (twice), 1.54 (twice), 2.20, 2.27 and 2.29, a total of thirteen feedings in one hour and forty-four minutes. I have recorded two feedings at 1.52 p. m. because at that time I saw the two parent Vireos stand on opposite sides of the nest and both feed the young at once. At 1.54 both birds were in sight near the nest at once and they fed the young in quick succession. At 1.20 and again at 1.52 one of the old birds, after feeding the young, removed excrement from the

nest and flew away with it. The young birds were brooded from 12.52 to 1.16, from 1.28 to 1.36, from 1.39 to 1.46, and from 2.29 to 2.35, when I departed for a few minutes. A light rain began to fall at 2.34 p. m. When brooding, the old bird often poked its bill beneath its breast to the nestlings, whether for caress, punishment, or rearrangement of the young I cannot say.

At 2.41 p. m. I returned and climbed to the nest, on which the old bird sat closely, but which it finally left in silence. The cries of the young were very noticeable, both before and after the old bird left them. The young themselves were distinctly larger, and the pin-feathers on their heads were further developed than they were before. Their eyes were not yet wide open.

*July 7.* The young Vireos were fed at 6.25 a. m., immediately after which I climbed to their nest. All four of them lifted their heads and opened their mouths when the nest was touched, but they uttered fewer cries than they had done previously. They were sitting in the nest two abreast, all heads one way, with one pair on top of the other. The eyes of two of them were nearly wide open on this, the eighth day from the hatching of the first egg. I presumed that these two were the oldest (Bird I and Bird II), and could easily distinguish between Bird III and Bird IV. I took one of the two oldest birds from the nest to examine it more closely and found that on all the feather-tracts the pin-feathers had burst. The feathers on the head and back were light grayish-brown, those on the wings were dark gray, and those on the underparts were light yellow. Nine large primaries, each very nearly an inch long, and each overlaid by a covert about half an inch long, could be plainly seen. The outermost of these was about the same length as the sixth (the fourth, if counting from the inner primary). But outside of these large primaries and their coverts were two pin-feathers, not yet burst, about one-fourth of an inch long and of practically equal length. They were inserted one above the other, lying parallel with the large primaries and their coverts, and were very evidently the true first primary and its covert. On this eighth day of nestling life (for I was afterward able to make quite sure that the nestling examined at this time was the oldest of the brood) they are readily observed. I replaced the bird in the nest and descended to the ground at 6.35 a. m.

*July 8.* At 2.30 a. m. I took a position near the nest. There was a dead calm at the time, the cloudless sky, in which was no moon, was lighted brightly by stars, and along the eastern horizon the bright glow of dawn had already appeared. The temperature was 49°F. Nothing was heard or seen of Vireos of any species until 3.33 a. m., when a Red-eyed Vireo began to sing in the oak woods. A light breeze began to stir the leaves at 3.35. The true time of sun-rise at Quebec on this date was 3.59 a. m., but sunlight was first noticed on the tops of the tall pine-trees at 4.14 a. m. If one of the parent Philadelphia Vireos was on the nest during the night, it must have left it before there was enough light for me to distinguish it, for the first that I saw or heard of this species on this occasion was a visit to the nest by one of the old birds at 4.06 a. m., when the young were fed. The first song from the male Philadelphia Vireo was heard at 4.19 a. m. Between 4.00 a. m. and 7.00 a. m. the young were fed at the following times: 4.06, 4.17, 4.29, 4.31, 4.38, 4.39, 4.40, 4.42, 4.45, 4.48, 4.49, 4.50, 4.52, 4.55, 4.56 (twice), 5.30, 5.54, 5.55, 6.00, 6.02, 6.03, 6.04, 6.05, 6.09, 6.12, 6.15, 6.18 (twice), 6.21, 6.28, 6.30 (twice), 6.32, 6.35, and 6.51, a total of thirty-six feedings, or nine for each young bird, in the first three hours of morning activity. At the times which I have marked "twice" the two parent birds fed the young in quick succession; I did not on this date observe them both giving food at the same instant, as I did on July 6. Between 4.05 and 4.57 there were sixteen feedings, between 4.57 and 5.53 there was one feeding only, and between 5.53 and 6.53 there were nineteen feedings. It will be observed that the feedings exhibit a marked periodicity, as though the young were given regular meals, with intervals of comparative rest. A similar periodicity can be distinguished in the feedings recorded on the afternoon of July 6, there being on that date an interval of twenty-five minutes from 12.52 p. m. to 1.17 p. m. and another interval of twenty-five minutes from 1.55 p. m. to 2.20 p. m. during which the young were not fed, although they were fed quite frequently before, between, and after those periods. It would be very interesting to obtain a record of the meal-hours and rest-hours throughout an entire day. It may be thought that the parent birds were simply satisfying their own hunger

during the periods when the young were not being fed, but my observations on this morning of July 8 do not support this view. From 5.10 a. m., or slightly earlier, one of the adult Philadelphia Vireos, with food in its bill, was seen sitting quietly on an oak twig about two rods from the nest, turning its head at times from side to side. The young were not fed at all during the twenty minutes or more of its remaining in that position, but at 5.30 it finally went to the nest and gave the young the food which it had been holding in its bill. Again, for seventeen minutes, from 5.37 to 5.54, I observed one old bird, with food in its bill, sit quietly in an oak while the young were not fed. It eventually took the food to them at 5.55 a. m. It is easy to understand that, when food is very plentiful, the parent birds could, by ceaseless endeavor, gather much more than they and their brood could eat, but it is worth while noting that, instead of distributing their spare time among feedings at average intervals, or of relieving one another in the work, they both cease feeding together from time to time, thus marking off fairly distinct meal-hours for the young.

I saw that excrement was removed from the nest at 4.31 a. m., but it is probable that such nest-cleaning often took place without my being able to observe it. I also noted at this time that from the ground I could see the young birds moving about in the nest when no old bird was near, and could also hear their "peep's." I ceased observing at 7.00 a. m.

At 5.13 p. m. I climbed to the nest. No cries were heard from the young as I ascended the tree, and when the nest was touched two only would raise their heads and open their mouths. I removed from the nest and examined three of the young, no two of which were equally developed. The one most developed was fairly well covered with feathers on its head, back and wings. Its short first primary had not yet burst its sheath, although the covert over it had burst out and was growing rapidly, as were all the other coverts and primaries. I replaced the birds and descended to the ground at 5.26 p. m.

*July 9.* The nest was observed at 6.55 a. m., 7.25 a. m., 12.00 m., 12.25 p. m., and 4.00 p. m., but no adult Vireo was seen near it at those times. At 4.12 p. m., when I took a position to observe the nest, no old bird was in sight. At 4.25 the two parent Vireos

went to the nest together, perched on opposite sides of it, and both fed the young at once. They next seemed to be occupied for several seconds in working together over the young, shifting them about in the nest, or something of that sort. Then one, presumably the male, left and began to sing loudly from the oaks, while the other bird sat quietly beside the nest until 4.34, when she departed by short flights from branch to branch. At 4.44 p. m. I climbed to the nest without seeing anything of the adult Vireos. I removed all the young birds from the nest and examined them. The "peep's" uttered by the two older members of the brood had by this time developed quite a buzzy quality. These two showed plainly the white line over the eye. The oldest of all was very yellow on the underparts, while the three others had the underparts white, with a slight, but distinct, wash of yellow. Individual variation in the degree of yellowness of the underparts, which showed itself at this early age, remained present in a striking degree in this brood as long as I was able to watch them, and it is not improbable that it appears in the adult plumage also, which would explain the differing estimates of this coloration which different observers have made. I could not see any difference in the degree of yellowness of the underparts of the parents of this brood.

On the two older birds the sheath of the short first primary appeared at this time to have opened at the tip, but, instead of a vigorous quill, only a few hair-like barbs protruded from it. These were completely overshadowed by the covert, which was growing rapidly.

I replaced the young birds in the nest and descended to the ground at 4.59 p. m. On viewing the nest, I saw that its occupants were moving about a great deal. At 5.00 p. m. one old bird appeared, with food in its bill, and hopped excitedly about the nest. It gave its burden of food to one of the young, then flew to the next tree, where it moved rapidly about, with crest raised, uttering the scolding note. It gave the young no aid in readjusting themselves in the nest. The oldest of the brood finally stepped out onto the twig beside the nest, where it maintained its balance with difficulty. Both old birds were now present, scolding continually, but keeping well away from the nest.

At last the young bird fell headlong, but with great dexterity grasped another twig about eighteen inches below the nest, and maintained its grip there. I climbed the tree again and, as I drew near to the youngster, one only of the parents dashed at me, crest erect, scolding loudly and rapidly. This was continued until I left the tree and was the first scolding I had received from an old bird when I was in the tree. The only previous time when one of them made any audible protest on such an occasion was on the afternoon of July 3, when the female uttered a few squeaks. I replaced the young bird in the nest and descended to the ground at once. When I had stepped away from the tree I heard the cries of a nestling, as though it had left the nest while I was climbing down. I could not see it, but decided to go up the tree again, which I did, finding three young only in the nest. This time both old birds came close about me and scolded me vigorously. I could not find the stray nestling, so returned to the ground and left the vicinity.

When I returned, at 5.53 p. m., all seemed quiet, but after a little I heard repeatedly the buzzing "peep" of the oldest nestling. The note seemed to come from somewhere in the lower foliage of the tree, but it was only after a long search that I found the young bird, snugly esconced in the acute angle formed by the lowest fork of the tree, where the trunk divided into two nearly equal parts, at a height of about five feet from the ground. I was greatly surprised to find that it had descended nearly twenty feet through the tree without sustaining any injury. I replaced it in the nest at 6.10 p. m. At 6.35 I climbed the tree and found that it was still in the nest.

*July 10.* I climbed to the nest at 6.35 a. m. and at 4.24 p. m. The first time both old birds appeared and scolded me as I went up the nesting-tree. The four young in the nest would not lift their heads at all when the nest was touched at that time. In the afternoon, however, I saw nothing of the parents when I visited the nest, and three of the young would beg for food as usual when the nest was touched.

*July 11.* By this date the young were so large that their wings hung over the edge of the nest. At 6.10 p. m. I climbed the nesting-tree, without seeing the parent Vireos, and found in the



nest four well-feathered young, which did not raise their heads or open their mouths when the nest was touched.

*July 12.* A few notes of Philadelphia Vireo song were heard about 5.00 a. m. At 5.40 a. m. I heard the persistent notes of one of the nestlings and thought that it must be out of the nest. When I reached the vicinity of the nesting-tree, at 5.47 a. m., the begging notes of this young bird continued to issue from the neighborhood of the nest, while one old bird was scolding in another tree nearby. The young in the nest were fed at 5.48, 5.53, and 5.57 a. m. Soon afterward I caught sight of the young bird which was out of the nest. It was several feet from its old home and maintained itself on a twig with apparent ease. Sometimes it would move a few inches, from one twig to another, when it would gain a new foothold only after much fluttering.

It therefore appears that, with this species, the time from the hatching of the first egg to the departure of the first bird from the nest is thirteen days, although my frequent visits to the nest may have shortened the time slightly in this instance.

At 6.09 a. m., while one old bird scolded me, I climbed the tree to try to catch this young bird for a last examination of its appearance before it should become able to keep beyond my reach. In this endeavor I passed near, but below, the nest, when I heard another young Vireo flutter from it. I then held a mirror over the nest and saw in it two motionless young. The bird which I was trying to catch finally flew from the tree and alighted on a gravel roadway about sixty feet from its starting-point. It did not seem to be able to make an upward flight. I returned to the ground and picked it up. It did not attempt further flight, nor did it make any outcry when I took it in my hand. I found the second young bird on the ground about ten feet from the foot of the nesting-tree and picked it up also. Bird I was very yellow beneath, while on the back and on the top of the head the feathers were mouse-colored, but with yellow tips. The whitish line over the eye showed plainly. Some remnants of down were still to be seen. The flight-feathers and wing-coverts were a dark gray, mostly edged with yellow on their front edges. The bill was light brown, with the hook at the tip of the upper mandible well-developed. The iris was a very dark brown. The tail was not

more than five-eighths of an inch long. The short first primary was now well out of its sheath, and was about three-eighths of an inch long, all gray, and very distinct when sought for, but ordinarily concealed by its covert and by the large second primary. A view of the primaries from below at this time reminded me strongly of the cut of the primaries of the Warbling Vireo as shown by Coues.<sup>4</sup>

Bird II resembled Bird I, although slightly less developed, except that its underparts, instead of being yellow, were white with a yellowish wash, and that the feathers on the top of its head lacked the yellow tips.

I placed the young birds in the lower branches of the nesting-tree, where they stayed fairly well, although from time to time an attempt at flight would bring them fluttering to the ground. They were picked up each time, always without protest on their part, and replaced on a safe perch, for fear of cats. The parents fed them frequently, and seemed to try to entice them toward the refuge of the woods. At 6.45 a. m. Bird I was seen on a perch about eight feet from the ground in a tree some thirty feet from the nesting-tree, so that it was evidently learning the art of flight quite rapidly.

At 6.50 a. m. I found Bird III out of the nest and perched in the lower part of the woodbine which climbed on the front porch of the house. When I tried to pick it up it fluttered away from me and when I finally grasped it it screamed loudly for a second or two. This was the only time that it or any of the brood acted in this way when picked up. It resembled Bird II, except that the tips of the feathers of the back were slightly browner and less yellowish. It also was placed in a tree.

I was obliged to depart at 7.25 a. m., but during the morning Mrs. Lewis watched over the three young Vireos and replaced them on safe perches whenever they fluttered to the ground, which, she assured me, was quite frequently.

At 1.00 p. m. I found Bird I on a perch about fifteen feet from the ground, where he could hardly be seen. He was now silent nearly all the time except when being fed. A little later he moved

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<sup>4</sup> Key to N. A. Birds, Fifth Ed. 1903.

to some other perch and I saw him no more. Birds II and III remained in the immediate vicinity all the afternoon and had to be picked up frequently. Bird IV remained alone in the nest and uttered a begging note similar to that of the other young birds of the brood. When a parent with food approached a juvenal out of the nest, the youngster, whether previously silent or begging, cried sharply in a screaming voice, with wings fluttering, body trembling, and mouth wide open, until it received the food. If one of them was held in the hand and its bill hit with a finger, it would act in a similar manner.

At 7.45 p. m., when dark was coming on, Birds II and III were seen perched on separate maple twigs, each with its head under its left wing, fast asleep.

*July 13.* The begging call of the young Philadelphia Vireos was first heard on this date at 3.48 a. m. When I went abroad at 8.10 a. m., quietness prevailed, but I soon found one young bird, probably Bird III, on a perch in the woods. It remained in that neighborhood throughout the day, being silent nearly all the time. I presumed that Bird II had made its way safely to the higher branches, beyond reach of my gaze.

At 9.02 a. m. I climbed to the nest and found Bird IV still in it. When I was not near it, it cried frequently. At 2.30 p. m. I found it on the ground about twenty feet from the foot of the nesting-tree and placed it on a twig near Bird III. These two birds resembled each other closely. At 4.35 p. m. I climbed to the nest to make certain that it was empty and that the last bird found was really Bird IV. Although the nest was empty and the young birds were two or three rods away, one parent bird, presumably the female, came close about me in the tree and scolded me vigorously. She was the only bird seen to feed Birds III and IV during the day.

At 7.42 p. m. these two young birds were seen fast asleep on maple twigs with their heads tucked under their right wings. Apparently they put their heads under either wing indifferently.

*July 14.* At 6.10 a. m. Birds III and IV were on their perches of the night before, but both were now silent except when they were about to be fed. A few minutes later I returned to find that Bird IV was still in its former place, but that Bird III had moved

elsewhere. I lacked time to search for it. Bird IV was noted again, for the last time, at 7.25 a. m.

At 12.00 m. I could see no *Philadelphia Vireos* in the vicinity, although I could hear the scolding note of one of the old birds far within the woods, where I had not time to seek it. I obtained no further observations of birds of this species which could be ascertained to belong to this family group. I shall be delighted if, in spite of my intrusions on their privacy, they return to nest near me next year.

The following is a brief outline of the chief events of this nesting:

June 12. Male seen chasing female.

June 13. Nest-building well advanced. Lining of nest not finished.

June 15. First egg laid.

June 18. Fourth (last) egg laid.

June 29. First egg hatched.

July 1. Third and fourth eggs hatched.

July 3. First cries of young heard.

July 12. Three oldest nestlings left nest.

July 13. Fourth nestling left nest.

July 14. Last observation of nestlings (two only).

#### NEST.

About four feet from the top of a young Rock Maple which was one of a row of such trees a small twig sprang at a considerable upward incline from the south side of the main stem of the tree, which was here one and one-fourth inches thick. The twig itself is one-fourth of an inch in thickness, and at a distance of one and one-eighth inches from the main trunk it divides at an angle of fifty degrees into two nearly equal parts, each of which is about five inches long and ends in a cluster of leaves. The pensile nest, which was well hidden and shaded by foliage, was hung from the fork between these two small twigs, at a height of twenty-four feet, eight inches, from the ground. Although the lower part of it is roughly circular, the rim is "gathered" to the twigs, so that the opening is shaped like a sector of a circle, with the two twigs

as radii, and the outer rim as the arc of the sector. The acute angle between the twigs is filled in for about three-quarters of an inch with nesting material. The "gathering" of the rim of the nest, causing the walls to be incurved at the top, must have been efficacious in retaining eggs and young within it when it tossed and swayed in the breeze, as it did very much in the slender top of the tree.

The inside dimensions of the nest are: along one radial side,  $1\frac{7}{8}$  inches; along the arc between the twigs,  $2\frac{1}{2}$  inches; maximum diameter within the bowl of the nest,  $2\frac{1}{8}$  inches; least depth (at center of arc),  $1\frac{3}{8}$  inches. The outside dimensions are: extreme width,  $2\frac{5}{8}$  inches; radial measurement from vertex of angle of twigs to outer extremity,  $3\frac{1}{4}$  inches; least height (at center of arc) 2 inches. The thickness of the bottom of the nest is  $\frac{5}{8}$  of an inch, while the walls vary in thickness from  $\frac{1}{4}$  of an inch to places where one can see through them readily.

The outside of the nest is composed of fine strips of the outer bark of White Birches, dead grass blades, coarse white hen feathers, bits of frayed white twine, one spider's white "cocoon," and much spiders' web. The birch bark is much the most conspicuous material. Ends of strips of it have been left loose, so that they flutter in the breeze, breaking up the outline of the nest and helping to conceal it. At points where strips of birch bark cross one another they sometimes seem to possess mutual adherence without visible binding material, as though they had been gummed together, perhaps by the bird's saliva. The nest is fastened to the twigs by spiders' web, strips of birch bark, string, and grass blades. The interior is lined chiefly with fine dead grass stems and flower-spikelets, but the lining includes also one or two needles of the White Pine and several white hen feathers, finer than those on the outside of the structure.

The nest has been presented to the Biological Museum of Laval University, Quebec.

#### VOICE.

The songs of the Philadelphia Vireo present marked peculiarities. The song heard from the male from June 13 to June 22, inclusive, was simple, but delightful; a low, sweet, gentle "Doo-

we? wheè-hooey; doo-we? wheè-hooey," uttered slowly and with long intervals between one utterance and the next. Sometimes the first utterance was elaborated into "Doodle-ee?." It was so low that it never would have been noticed by one who was not a bird-student, and it was so unlike the other Vireo songs with which I am familiar that I never should have thought the utterer a Vireo before seeing him. This song was uttered by a bird on the nest, by a bird hunting food, and by one bird when attending the other during nest-building. I cannot state positively that the female, as well as the male, utters it in its entirety, but I think that she does so, as I have heard her sing a loud "Doodle-ee?" This song was never sung frequently and was heard very rarely after June 22.

On June 21 I counted for five minutes the song-utterances of a bird which was singing this song among the oaks, and found the number of utterances per minute to be seven, seven, nine, eleven, and six, respectively. A similar count for one minute on June 22 of the utterances of a bird singing this song from the nest showed seventeen utterances to the minute, which I consider to be quite the highest rate at which I heard this song delivered.

A study of the songs of a number of Red-eyed Vireos about Quebec showed that they often contained "Wheè-hooey," but never "Doo-we?," with the sole exception of the song of the Red-eye which was neighbor in my shade trees to the Philadelphia Vireo. This bird sang both of the above-quoted utterances, which made me wonder if his song had been affected by that of his nearby relative. He and the other Red-eyed Vireos, however, uttered all their notes in their usual vigorous, matter-of-fact tone, very different from the sweet, low, gentle tone of this slow song of the Philadelphia Vireo.

On June 23, and often thereafter, the male Philadelphia Vireo sang a song altogether different from that which I have described. This new song was loud and vigorous, and was readily recognizable as a Vireo's song, although the tone in which it was given was not quite so full as is the tone of the song of the Red-eyed Vireo. It consisted of notes like "S-s-s-càpe! ee-òh-yuh! ee-yòit! chèeb-ly!", and perhaps one or two others, repeated over and over in different orders. The utterance "S-s-s-càpe!", which was the

most striking part of the song, was sometimes rendered more completely as "S-s-s-càpe-s-s-s!". Very rarely two notes were uttered without any intervening pause. This song was sung very frequently from June 23 to July 4, although the bird was much more silent on cold, windy days than it was in fine weather. On June 24 I noted that the Philadelphia Vireo was singing far more persistently than was the neighboring Red-eye. Counts of its song-utterances for three minutes on that date gave twenty, twenty-eight, and twenty-nine phrases, respectively, per minute.

On June 25, when the female had left incubation to feed, the male, while following her through the lower branches of the trees, sang, in a loud voice, "Chee-òw-y! hee-ùh!," over and over again. This song was heard at such times only. Other loud songs which were heard often from this male after June 23 were "Whèe-hoit! s-s-s-jèrry!" and "S-s-s-chèw-ee! whèe-hooey!" After July 4 singing rapidly declined, the last song heard from this species being a few loud notes on July 17, three days after I ceased to find the juvenals.

A Philadelphia Vireo which was resident in 1919 in an area of White Birches about one hundred yards behind my house usually sang repeatedly, in a loud voice, "S-s-s-kòo-hee? s-s-s-kill-it-wàyw! s-s-s-wày-wer!" Other Philadelphia Vireos heard during the nesting-season sang similar loud songs, but the songs of no two of them were exactly alike. It would appear that, as with other common birds, the loud songs of individuals of this species differ, but are all specifically recognizable on account of similarity in quality and tone. I might point out that many common song-phrases of the Red-eyed Vireo, such as its plain little "Huh-huh," do not appear in any recognizable form in the songs of the Philadelphia Vireos heard by me, and that this seems to provide one ready means of distinguishing between the songs of the two species.

All the loud songs which I heard from Philadelphia Vireos were heard between June 23 and July 17, and this fact, combined with the inconspicuousness of the species and its similarity in appearance to other Vireos, seems to explain why so few specimens of this bird are noted in migration, and why Brewster, as he himself suggests, failed to find the species about Lake Umbagog between

May 12 and June 15 in 1896 and 1897, although he had formerly found it common there. If prior to the middle of June or later, this species is silent, or sings only in a low voice, unlike Vireo voices in general, it might easily be overlooked. A loud song heard by Brewster<sup>2</sup> at Lake Umbagog on June 14, 1903, may be found to be an exceptionally early one.

The only songs which I know with certainty were uttered by the female are two loud "Doodle-ee?'s," a few very low notes, and the song which she sang just after laying her last egg on June 18. This latter song was very sweet, clear, and simple, and was sung slowly for eight minutes in a low voice. It consisted of a variety of notes, such as "Hùllit; ee-dò-it; wày-wer; ee-chèw-ee; doo-we?; hùllit-whew!", uttered over and over in a different order each time. The effect was charming. Philipp and Bowdish<sup>3</sup> speak of the female singing from the nest in reply to the male, but I noticed nothing like this except that the female sang "Doodle-ee?" twice from the nest while the male was singing in the woods just after they had fought together furiously on the morning of July 3.

Other notes heard from the adult birds were a mouse-like squeaking, a scolding note, a fine "It, it, it, it, it," and (from the female only) a "Mew, mew." The squeaking seemed to be generally a love-making note, uttered when the birds were close together, though on July 3 it was uttered in protest against my presence at the nest, as well as during the quarrel between the adult Vireos. The scolding note resembled distantly that of the Red-eyed Vireo, but was not so loud and was shorter, harsher, and less resonant. It was often uttered three or four times in close succession. When the birds were very angry it became prolonged and double-syllabled, a grating "Ee-yùh!" The fine "It, it, it, it, it," which was uttered either when perching or when on the wing, seemed to be a conversational note, and reminded me much of a similar fine note of the Red-breasted Nuthatch. The "Mew, mew" of the female apparently indicated readiness for coition.

The first note of the young was a faint "Peep, peep, peep." By the time they left the nest this had become louder and harsher,

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<sup>2</sup> 'The Auk' XX, pp. 369-376. October, 1903.

<sup>3</sup> 'The Auk' XXXIV, pp. 265-275. July, 1917.



a loud "Weh!", like the begging note of young Robins just out of the nest, but a little shorter and weaker than that. It was found by direct comparison to be much harsher than the begging note of a young Red-eyed Vireo. Sometimes it was two-syllabled and sounded like "Ke-wèh!". When a young bird was first out of the nest it uttered this note at frequent intervals as a begging call, but it appeared to cease using it as soon as it could accomplish a successful upward flight, generally within twenty-four hours after it had left the nest, this being in marked contrast to the continued use of the begging note by young Red-eyed Vireos. When a young Philadelphia Vireo was about to be fed it cried "Z-z-z, z-z-z-z, z-z-z," in loud, screaming tones.

#### FOOD AND FEEDING HABITS.

Food which I saw the adult Philadelphia Vireos take to their young consisted largely of naked caterpillars, brown, green, and whitish, and of flying insects of various kinds. On July 4 I saw the young being supplied with an insect which Mr. Dionne identified, from my description, as one of the Ephemeridae, probably *Palingenia bilineata*. When the nest was taken down, after the young had left it, it was found to contain the shell of a young snail (*Limnea* sp.?) and the remains of the abdomen of some small flying insect, such as a fly or a wasp.

The birds fed usually in the border of the woods, among the lower limbs of the Red Oaks and Red Maples, less often among the White Birches or the Rock Maples. The pair which resided among the White Birches a hundred yards behind my house probably fed among them.

I found the Philadelphia Vireos to be rather more active in their feeding-habits than are the Red-eyed Vireos. The trick mentioned by Dwight<sup>5</sup> of hanging back-downward, like a Chickadee, from a cluster of leaves while picking insects from it was observed frequently, but the majority of the food of this species seemed to be taken while the birds were on the wing. They would leap repeatedly into the air to snap up passing insects with distinct "click's" of the bill. At other times they were seen

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<sup>5</sup> 'The Auk,' XIV, pp. 259-272, July, 1897.

hovering like Kinglets before branch-tips while they gathered food therefrom. The work done by this pair of Philadelphia Vireos must have aided greatly in keeping the trees in their vicinity free from insect pests this summer.

#### OTHER ACTIONS.

A third Philadelphia Vireo was seen several times in the vicinity of the nest. On July 1, at 5.38 p. m., one bird was seen to relieve the other on the nest while a Philadelphia Vireo sang continually from among the oak trees. On July 8, at 6.03 a. m., the female was about to feed the young birds, while the male sang nearby, when a third bird of this species approached the female. The singing male darted at him and chased him about for two or three minutes, until at last he departed. While the chase was going on the female continued to feed the young. At 6.05 a. m. two old birds were peacefully beside the nest, where one of them fed the young, while the song of a Philadelphia Vireo came from the oaks. On the morning of July 12, when the young birds were leaving the nest, I thought I saw three adults of the species about, and, by "squeaking," I was able to bring all three into view in front of me for a moment.

The three Philadelphia Vireos remained about the young all that day, and one of them was observed to chase the female frequently while she was seeking food and bringing it to the young. At such times the pursuer uttered the fine "It, it, it, it, it." The next day, July 13, similar pursuits were seen, but the female appeared to take more kindly to them. Several times in the morning and once in the afternoon she was noticed to fly toward her pursuer, perch, lift her tail, and cry "Mew, mew," immediately after which coition apparently took place. Sometimes this occurred while another male Philadelphia Vireo sang very near at hand. Although I watched closely, I was not able to discover any other signs of the rearing of a second brood.

In the afternoon of July 13 a young Red-eyed Vireo just able to fly wandered near the young Philadelphia Vireos; and in consequence the two busy mother birds met frequently while seeking food for their respective young. At such times they would quarrel violently, and the Philadelphia Vireo was always driven some dis-

tance away. Each time she returned to her duties as quickly as possible.

#### ABUNDANCE

The particular pair of *Philadelphia Vireos* whose nesting I have described took up most of my spare time during the nesting-season of 1919, which was my first nesting-season at Quebec. In consequence, I did not obtain much information regarding the abundance of this species in this vicinity at that season. Altogether I noted seven singing males of this species, besides the apparent intruder on the family life of the pair near my house. Of these seven, one nested in my yard, one resided in the White Birches one hundred yards or so behind my house, and the third lived in shade trees near a house about one-quarter of a mile away. The four others were heard singing on a trip made on June 30 to the valley of the lower Montmorency River, about ten or twelve miles northeast of Quebec. Two of them were in hardwood second-growth on poor, sandy land, and the other two were in alders beside the river, all at an elevation of from three hundred to five hundred feet above sea-level. Choosing one individual, out of the four, I followed up the song to verify identification by looking at the bird, and saw it plainly for some time at a distance of six feet, identifying it beyond question. Probably the species is not uncommon about Quebec.

It has never been recorded from this vicinity before, and indeed I can find only two records of its occurrence in the province, that of Dwight<sup>5</sup> of birds seen and taken at Tadousac, about one hundred twenty miles northeast of Quebec, and a record mentioned by Brewster<sup>2</sup> of a breeding specimen taken in Quebec Province near Ottawa.

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<sup>5</sup> 'The Auk,' XIV, pp. 259-272. July, 1897.

<sup>2</sup> 'The Auk,' XX, pp. 369-376. October, 1903.